Claims

What is claimed is:

1. A sequential processing reaction vessel comprising:

a pressure resistant outer housing formed from a microwave transparent material, said housing being able to withstand at least 150 psi of internal pressure;

a chemically inert inner housing formed from a microwave transparent material, said housing positioned within a cavity formed by said outer housing, said inner housing being resistant to reaction with corrosive liquids at temperatures up to 150° C and pressures up to 150 psi;

a chemically inert membrane filter positioned within said inner housing, said filter arranged in an essentially horizontal orientation to accommodate placement of a solid sample material, said filter having a pore size which is smaller than the typical partical size of said solid material for retention of said samples, said d filter permitting passage of said corrosive liquids;

a chemically inert, microwave transparent top valve, said valve permitting introduction if said corrosive liquids to a reactor volume formed by said inner housing; and

a chemically innert, microwave transparent bottom valve, said valve permitting removal of said corrosive liquids after reactive contact with said solid sample.

SEQUENTIAL PROCESSING REACTION VESSEL FOR CHEMICAL FRACTIONATION AND ANALYSIS

A sequential processing reactor vessel and method is disclosed for accelerated extraction and fractionation of chemical analytes from complex solid sample materials. The device and method provide for sequential extraction of elemental constituents from solid materials by sequentially contacting target samples within a single reaction vessel using a series of different reagents at temperatures as high as 150° C and pressures up to 150 psi to accelerate reactions. The aggressive chemical treatments provided by the disclosed device and method provide for complete digestion of solid samples in liquid analyte samples that can be directly analyzed by conventional spectrometry or other suitable methods. The disclosed device and method provide for efficient sample processing and accelerated reactions to significantly reduce processing times and costs for elemental analysis of solids while improving accuracy, precision and reliability of results compared to conventional devices and methods. The disclosed device and method are compatible with both conventional convection and radiant heating sources as well as microwave heating and can be readily adapted to marine, geological, environmental, industrial and research solids analysis applications.